

# **Evaluation of HAP Estimates for New Haven, Connecticut**

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# New Haven

- Coastal city bounded by hills
- Junction of 2 major interstate highways
- Population of 123,600
- 21% of its population below poverty level.



# Air quality issues

- Nonattainment for ozone; may be for PM2.5 as well
- New Haven county has second largest amount of urban air toxics in New England



# Sources of Air Pollution in New Haven

- Large stationary sources include petroleum storage facilities, fabric coaters, and metal products industries.
- Smaller sources include many graphic arts and auto refinishing facilities.



# Sources of Air Pollution in New Haven

- Mobile sources include emissions from 2 major interstates, the Tweed-New Haven airport, the Providence and Worcester rail-line, and the Port of New Haven



# Inventory work in New Haven

- EPA provided funding through our Community Air Toxics Assessment program
- Work done by graduate students at Yale, New Haven Board of Health, and New Haven Office of City Plan
- Work done to date has focused on stationary sources; future work will be on mobile sources.
- Goal is to use for control strategy development





# Major Point Sources

- New Haven used the draft version 3 of the NEI for HAPs as a starting point; 28 sources
- Updates were made to 10 of these sources by replacing 1999 TRI data with 2000 TRI
- CT-DEP's periodic emissions inventory contained VOC estimates for 12 additional sources; New Haven used EPA's Speciate database to translate into HAP estimates.

## HAP Emissions derived from VOC Inventory

Name	VOC Emissions (tpy)	HAP Emissions (tpy)
Yale University Central Power Plant	18.5	7.2
H.B. Ives Company	12.3	8.7
U.S. Repeating Arms	7.5	1.0
Simkins Industries	1.1	1.1
Williams Energy Vertures (Forbes St.)	27.7	5.9
Williams Energy Ventures (Waterfront)	33.3	7.1
Electrix, Inc.	3.0	1.7
G&O Manufacturing	19.6	2.7
Knights of Columbus	3.8	3.3
Milford Barrel Company	2.8	0.4
Sylvan Cleaners	0.8	0.8
Conn Classic Cleaners	0.6	0.6
<b>TOTAL</b>	<b>131.0</b>	<b>40.5</b>



# Major Point Source Summary

Company	Total HAPs (tpy)	Significant HAPs
Saint Gobain Plastics (fabric coating)	51.3	<b>Toluene</b> , Xylenes, Methanol
Urettek Inc. (fabric coating)	25.3	MEK, N-Methyl-2- Pyrrolidone, <b>Toluene</b>
Gulf Oil Terminal	18.3	Napthalene, MTBE, Benzene, <b>Toluene</b>
Von Roll Isola USA, Inc. (fabric coating)	13.6	MEK, Xylenes, <b>Toluene</b>
H.B. Ives Co. (metal parts surface coating)	11.7	TCE, Methylene Chloride, Copper comp
<b>Total for these 5 Sources</b>	<b>120.2</b>	
<b>Total for all 40 Point Sources</b>	<b>168.7</b>	

# Area Source Categories

- Gasoline distribution (stage 1 and 2)
- Aircraft refueling
- Dry cleaning
- Traffic Markings
- Graphic Arts
- Automobile Refinishing
- Architectural Surface Coatings
- Consumer Products
- Structure Fires
- Residential Combustion (oil and gas)

# Comparisons to NEI Data



## Stage 2 Comparison

- New Haven derived city level gas consumption by averaging data from the State Office of Policy and Management and from the State Department of Revenue
- NEI County data apportioned using gasoline consumption data
- NEI based city estimates **5% lower** than what New Haven found, except:
- Hexane and MTBE show different correlation due to differing assumptions about Reformulate gasoline

HAP	City's Estimate (tons/year)	NEI County Estimate (tons/year)	NEI City Estimate (tons/year)
Toluene	0.62	4.49	0.59
Xylene	0.23	1.69	0.22
MTBE	5.8	9.53	1.25
Hexane	4.34	5.59	0.73

# Aircraft Refueling

- New Haven obtained the amount of aviation gasoline and Jet-A fuel used, then used the lead speciation profile from the NEI area source guidance.
- NEI county data was apportioned to New Haven's airport using data from the CT-DEP periodic inventory on the number of LTO's in New Haven county, and LTO data for New Haven's airport.
- NEI based city estimate **67% lower** than what New Haven found.

HAP	City's Estimate (lbs/year)	NEI County Estimate (lbs/year)	NEI City Estimate (lbs/year)
Lead	0.140	0.308	0.046

# Automobile Refinishing

- Telephone survey used to collect local employment data
- CT-DEP state specific per employee VOC emission factor
- For comparison, county vs. city employment data used to apportion NEI data to city level
- NEI based city estimate **28% higher** than New Haven's

HAP	City's Estimate (tons/year)	NEI County Estimate (tons/year)	NEI City Estimate (tons/year)
Xylene	2.86	44.7	3.67
Toluene	1.44	22.6	1.85
MEK	1.29	20.2	1.66
Methyl Isobutyl Ketone	0.34	5.38	0.44



# Residential Heating with Natural Gas

- Local data obtained from So. CT Gas Co.
- For comparison, NEI county data apportioned to city level using ratio of city to county gas consumption rates.
- NEI based city estimate **34% higher** than New Haven's estimate

HAP	City's Estimate (lbs/year)	NEI County Estimate (lbs/year)	NEI City Estimate (lbs/year)
Formaldehyde	196	1,058	263
Benzene	5.48	29.6	7.37
Naphthalene	1.59	8.6	2.14

# Structure Fires

- Local data from New Haven Fire department used
- Fuel loading factor from CARB
- For comparison, NEI county level estimate apportioned to city level using population
- NEI based city estimates **14% lower** than New Haven's estimates

HAP	City's Estimate (tons/year)	NEI County Estimate (tons/year)	NEI City Estimate (tons/year)
Acrolein	0.68	3.89	0.59
Formaldehyde	0.16	0.90	0.14
Hydrochloric Acid	2.34	13.3	2.02
Hydrogen Cyanide	5.49	31.2	4.75

# Gasoline Tank Truck Filling (stage 1)

- NEI contains no estimate of stage 1 emissions for New Haven County
- NEI - inaccurate geographic allocation scheme; also includes emissions from filling tank trucks at terminals
- New Haven calculated Stage 1 emissions and found:
  - MTBE 1.42 tpy
  - Hexane 1.07 tpy
  - Toluene 0.15 tpy
  - Emissions for 6 other HAPs

# Traffic Markings

- New Haven obtained local data from the 2 groups responsible for this in the city.
- MSDS sheets indicated quick setting epoxy paints used; only HAP was Methanol: 0.81 tpy
- By contrast, NEI contains estimates for 13 HAP typically associated with solvent based paints.



# Graphic Arts

- New Haven used ink sales data method from EIIP
- Speciation profile from NEI area source documentation (6 HAPs)
- Speciation profile for 2 of the 6 HAPs differs greatly between area source documentation and NEI raw data files.
- For comparison, NEI county data apportioned to city level based on employment data.
- New Haven found much greater amount of HAPs from graphic arts than what's predicted in NEI
- Activity levels:
  - NEI: 523 employees in New Haven county
  - 2000 Census: 2,953 employees in New Haven county

## Graphic Arts

HAP	City's Estimate (tons/year)	NEI County Estimate (tons/year)	NEI City Estimate (tons/year)
MEK	<b>617</b>	284	<b>96.3</b>
Methyl Isobutyl Ketone	<b>168</b>	77.3	<b>26.2</b>
Toluene	<b>73.7</b>	33.9	<b>11.5</b>
Methyl Carbitol	<b>0.455</b>	0.209	<b>0.0709</b>
Dibutyl Phthalate	<b>113.7</b>	0.157	<b>0.0532</b>
Toluene Diisocyanate	<b>0.341</b>	5.23	<b>1.77</b>



# Dry Cleaning

- New Haven used information from a business trade group, and the yellow pages, to locate dry cleaners
- CT-DEP state-wide survey from the early 1990's used as basis for amount of perc usage
- This survey adjusted to account for population growth, and the implementation of Federal and State regulations
- Perc emissions comparisons:
  - New Haven's Estimate: 17.9 tpy
  - NEI county extrapolation to city: 7.8 tpy

# Residential Heating with Oil

- \* New Haven surveyed 10 local oil distributors to collect activity data
- \* For comparison, NEI county data apportioned to city based on oil use rates
- \* Different activity assumptions:

CT-DEP inventory: 18.24 trillion BTU's in county

NEI assumption: 2.36 trillion BTU's in county

HAP	City's Estimate (tons/year)	NEI County Estimate (tons/year)	NEI City Estimate (tons/year)
Formaldehyde	0.307	0.283	0.040
Acetaldehyde	0.045	0.041	0.006
Naphthalene	0.010	0.009	0.001

# Area Source Summary

Source Category	NEI derived city estimate is:
Res. Heating with Gas	+ 34%
Automobile Refinishing	+ 28%
Architectural Surf. Coating; Consumer Products	0
Stage 2	- 5%
Structure Fires	- 14%
Dry Cleaning	- 56%
Aircraft Refueling	- 67%
Graphic Arts	- 85%
Res. Heating with Oil	- 87%
Traffic Markings	Different set of HAPs
Stage 1	No emissions in NEI

# Work to be Done

- Non-road engines, including rail, CMVs, and aircraft (recently completed)
- On-road Mobile
  - New Haven has collected local traffic count data, and is working with the CT-DEP to translate into on-road mobile source estimate

